Hydrogeted amorphous carbon films

Abstract

Hydrogenated amorphous carbon (a-C:H) thin film is one of the most studied materials due to its unique features. The a-C:H thin film is a remarkable material because of its novel optical, mechanical and electrical properties and its similarities to diamond. In this chapter we reviewed the structural and optical properties of hydrogenated amorphous carbon (a-C:H) thin films prepared in a DC-PECVD reactor. Both power and ion bombardment energy were continuously changed during the deposition, as a results of varying deposition parameters such as chamber pressure, electrode distance, CH 4 flow rate, and substrate temperature. The films properties ranged from polymer-like to graphite-like a-C:H films, as the power and ion energy increased. The structure and the optical properties of a-C:H films were analyzed by infrared and Raman spectroscopy, UV–Vis Spectro- photometer and photoluminescence. This is to extract the information on sp 3 /sp 2 and hydrogen contents, optical gap, E 0 and photoluminescence properties of a-C:H films. The films were found to consist of sp 2 clusters of which the size increases with increasing power and ion bombardment energy during the deposition, resulting in lower hydrogen, sp 3 content, optical gap and photoluminescence response. The increased in hydrogen termination from the films at higher ion energies results in bigger cluster size and produced graphitic films.